# CHAPTER IV: ACUPUNCTURE: AN EVIDENCE-BASED ASSESSMENT

## How Does Acupuncture Work?

I want to take you very briefly through a few studies to suggest how acupuncture analgesia works, how acupuncture works for suppressing pain, and that acupuncture works in a manner that if you have a negative condition, it will bring it back up to a normal state. If you have a hyper condition, it will decrease it back to a normal state. We call this homeostatic regulation. A friend of mine has now suggested that we shouldn't use the term homeostatic any more to talk about how the body works; we should use the term homeodynamic because we're not coming back to some fixed level. We're coming back to a level of health, which fluctuates, and the fluctuation is what's healthy. People who are doing research now in cardiology, in how the heart works, are finding that healthy is a certain level of fluctuation; when you lose that level of fluctuation, that's an early sign of ill health. So all these years when we've talked about homeostasis and homeostatic regulation, think about homeodynamic instead.

Finally, I want to talk a little bit about evidence for acupuncture points and meridians, to come back to where we started. Well, this is a very early study. I like this study. It was done in 1973 in China. This was a time in China, just post-Cultural Revolution, when there were no names on studies. This study was done by the First People's Hospital Group on Acupuncture Analgesia.

Basically, these were human volunteers who received acupuncture for 50 minutes. This was a long treatment. A pain threshold level was measured gradually. What they did was they injected a very tiny amount of potassium ions, which feel painful. One of the first things that leaks out from the tissue, if you get a cut or if any internal tissue is damaged so that if you get internal bleeding, is potassium ions, and the body recognizes that as an early indication of damage, and you feel pain.

They found that as they continued to give acupuncture, the pain threshold increased and increased, but it increased very slowly. This was the first indication, back in 1973, that acupuncture was suppressing pain not by affecting the nervous system directly. If it affected the nervous system directly, it would be very rapid. But this was suggesting that some type of hormone was being released into the bloodstream, or released into the cerebrospinal fluid, bathing the spinal cord and the brain. That hormone was responsible for the acupuncture effect on suppressing pain.

If you know one point in acupuncture, it's probably this point. It used to be called Hou Cu in the early days back when we said Peking; now that we say Beijing, this point is called He Gu. But that's a very popular point. That's one of the major points that was used in treating the postoperative dental pain. This is what they used here. If you inject a tiny amount of a local anesthetic into this point and then give acupuncture, it doesn't work. So, they're suggesting that acupuncture is stimulating the nerves to release a hormone that itself is causing the suppression of pain. So, what could this hormone be?

We now know that one of the major hormones we release that suppresses pain is what we popularly call the endorphins, but we really should call them endogenous opioids, because there's at least 3 and maybe 4 different families of endorphins, or of endogenous opioids. One of them is actually called endorphin or beta-endorphin; 2 others are called enkephalin and dynorphin. Dynorphin was actually discovered in Southern California, at Cal Tech, and because of a surfer. There was a surfer in the lab at the time, and this particular endorphin was the most potent on a mole-for-mole basis, molecule for molecule, the most important. So, he suggested they should call it the dynamite endorphin, which got shortened to dynorphin—that's how things get named.

Once acupuncture started to be used as an adjunctive anesthetic during operations, people had to stay with the patient for several hours twirling the needles, watching their level, and watching their state of anesthesia. The Japanese decided, we're watching, we're seeing, we needle to get analgesia to get pain relief at different frequencies. We either rotate the needle very fast or sometimes we rotate it rather slowly; maybe there's a

relationship between the speed at which we twirl the needle and the frequency of electrical stimulation that we can give through the needles. So, they developed various devices so that you could just take a tiny little alligator clip, put it on the needle and deliver very small amounts, that you can't even feel, of electric current; you can get a more potent pain relief that way.

Basically, they looked at low frequency electrostim, which is what we call 2 hertz—hertz means cycles per second—and high frequency, which was 100 hertz**.** What they found was that when you stimulated at low frequency, you get this one type of endorphin released, the enkephalin, but not at 100 hertz. Here's before and here's after. With this low frequency, we get a big increase in the release of the enkephalin, and no release of enkephalin at 100 hertz. Whereas when we look at the dynorphins, there's no difference before and after when we used low frequency, but there's a big difference before and after at high frequency. Anyway, what this means is if we can get different types of endogenous opioids, different types of normally releasing pain killers to be released at different frequencies, maybe we could get even better pain relief if we varied the frequency from low and high. This is an excellent case of where basic research led to an improvement in clinical practice because now, every electrostimulator that's used in an acupuncture clinic has a setting where it will automatically switch back between 3 seconds of low, 3 seconds of high. You get a much stronger and quicker relief of pain because you're releasing many different types of endogenous opioids and not just one.

I'll tell you briefly about this effective acupuncture as a homeostatic or, as I said, a homeodynamic regulator. If you have a hyper condition, it will release it; if you have a hypo condition, it will stimulate it. Needling at the same points, exactly the same points, this study looked at the effective acupuncture on heart rate. These were normal individuals, not patients with high blood pressure or any other cardiac condition—normal people. They arbitrarily divided these 30 individuals—actually there were 29—into 3 groups. They came in the door, no acupuncture. They just looked at their heart rate level. There were 10 in the lowest group, 9 in the intermediate group, and 10 in the high group. We're looking at the low normal, the normal normal, and the high normal range. Nothing

here has to do with pathology. Then, all of them were given acupuncture at the same points. The dark bar is where the heart rate increased, the stippled bar is where there was no change, and the open bar is where there was a decrease. In the 10 subjects who were in the low normal range, 7 out of the 10 of them showed an increase in their heart rate. Of the 10 that were in the high normal range, 9 out of 10 showed a decrease. So what is acupuncture doing? In the high normals, it's decreasing. In the low normals, it's increasing. It's coming back to a normal state. In this study, although I didn't show it, they did the same thing for blood flow and for blood pressure, and came up with the same findings.

I'll finish up with a few studies on what acupuncture points are. What are meridians? Well, here is a study that was done back in 1976; it is still one of the nicest, cleanest studies that I've seen. I also like it because it was done in what we call a blinded manner. An acupuncturist came and drew a line with washable ink along the meridian. Then, a technician came and used this device; there's a little wheel in here so that you're going to get a constant reading of electrical activity. We're not stimulating here. We're just reading the electrical activity along the meridian. We're going to plot a continuous readout of this electricity. This is what's called the large intestine meridian, and the large intestine meridian has our popular point again, LI4. In this terminology, large intestine 4 is Hou Gu or He Gu, so that's number 4. But, basically, what they found was that the technician who is wheeling this electrode doesn't know anything about acupuncture, doesn't know where along this meridian line the points are supposed to be. What this is, is 3 successive scans, 3 times where this electrode has been wheeled along this meridian. Each time, you get hills and valleys, and the hill corresponds to the site of an acupuncture point. So, this and other studies are suggesting that, yes, even though we can't find anatomically anything that correlates with an acupuncture point, we can now fairly reproducibly say that acupuncture points are sites on the body that are better at conducting electricity than points nearby. We don't know why yet, but this is a step forward.

The last studies I'll talk to you about are the most exciting studies, I think, that have been done with acupuncture because they have been using state-of-the-art technology. Remember I said that back in the late 1970s when I had my sciatica? There was only x-rays for medical imaging and now we have CT scan, ultrasound, and MRI. Now, normal MRI, if we just said MRI, just takes photographs of the brain. It's an amazing system for taking what we call optical sections. We can take a section through the brain here and here and here and then we can do it this way and then put it together to construct 3-dimensional pictures. For a condition like multiple sclerosis, that's one of the few fairly certain diagnostic criteria. If you have an MRI done, you can see the number of what's called the sclerotic plaques, which gives multiple sclerosis its name. But, functional MRI, or fMRI, is very different. That looks at the parts of the brain that light up, that are being used when you're doing a particular activity. During vision, the part of the brain that lights up is in the back of the brain, the visual cortex. You can see functional MRI signals. When you hear music, the auditory cortex, on the sides of brain, light up.

There was a professor and, even though he was Korean, he never had any acupuncture, herbs, or any traditional medicine. A professor of physics, of radiation physics at the University of California at Irvine, was back in Korea giving a talk on physics. This was a man who was the co-inventor of the CT scan and is now working on functional MRI. He gave a talk to a physics department in Korea, went hiking in the mountains with friends, slipped and hurt his back. They managed to get him to a massage therapist, and he became well enough to get back on the plane to come back to Los Angeles. If any of you have had back pain, you know the worst thing to do is to sit for a long period of time. When he got off the plane in Los Angeles, he could barely walk. At this point, massage therapy wasn't working any more, nothing was working; he was just taking these pain pills.

Finally, they convinced him to try acupuncture and, as in my case, as in James Reston's case, acupuncture doesn't work for everybody, for every condition. But, again, this was a

third bit of luck because with Professor Cho[1] it worked really well. He said, "What is this acupuncture?" He said, "I'm doing functional MRI. Can you tell me any acupuncture points that are used for vision?" That's what they started with. "I want to know if an acupuncture point that you tell me is used for eye disorders, can I see anything in the visual cortex?" Everybody thought this was really crackpot. These functional MRI devices cost millions of dollars. They had to go, in Korea, at 3 o'clock in the morning to the hospitals that would let them have some time on it. They used a point on the side of the little toe, bladder 67. In some conditions, it's used for eye disorders, and they were amazed. What they found was, first, when they used a flashing light, if I put this light right on my retina, then you see this is the back of the head. This is a slice through very close to the back of the skull. That's where the visual information is processed in the brain. This is from needling this point on the little toe; it lit up in the same area.

They tried another point. People said, "There's another point that's even better, called GB37, it's on the gallbladder meridian." They said, "That point, if you translate it from the Chinese, it's called bright eyes." That's the main point used for even more signals, in the visual cortex. As with any good study, you have to do a control. When they needled an acupuncture point on the side of the big toe, same distance away from the brain, no signal. Very interesting. This is the fascinating thing in science. When you get a phenomena, it's repeatable, other labs repeat it. We don't know what it's caused by, but we have a phenomena. Let's nail it down as we say, then we'll slowly open up the black box and try to figure out what it's due to. Here, again, this is the visual reference, that's them shining the pen light on the retina so they see several different optical sections. That means different sites in the brain. Here's again needling the bright eyes, acupuncture point, same area is lit up.

Then they went further and they said okay, here's our visual reference, here's our pen light. Now what happens? We'll take these same subjects and we'll play music to them. Now what they're getting is signals mainly on the sides of the brain in the auditory

[1] Please note that Dr. Cho's work has been corrected. For more information on these corrections, please visit http://www.pnas.org/cgi/content/full/103/27/10527-a

cortex. That's where we process information that we hear. Now we're going to use a point the traditional acupuncture says is useful for ear disorders, gallbladder 43, and now we're seeing signals on the side. In one case, they see not only auditory information, but also visual lighting up; both areas light up. They got worried, how come? People who do this kind of functional MRI say not to worry; very often, when you hear music, you see images. So, it's very common.

So, what is going on here? Well, the traditional Chinese medicine people say, well, this is wonderful. This validates our longstanding understanding of meridians. It doesn't help me understand what a meridian is, but it does validate. It is using state-of-the-art biomedical imaging techniques to validate point recommendations—acupuncture point recommendations. Other people say, whoa, there must be nerve pathways here. Like there must be a nerve pathway from the side of my little toe up to my brain that nobody ever found before, that's involved in vision. Well, I don't think so. But, people do; they want to hold on to this old way of looking at things.

So, is it meridians? Is it neuropathways or is there something else? I mean, if you stimulate the side of the little toe or the GB37, the side of the calf, and you get a signal, something is going on. There is a cause and effect there. So, I think that we are going to be hearing, in years to come, of a different sort of signaling system in the body, and that this signaling system may be the basis for the traditional meridians. Although we don't know where they are, there's a functional basis for them, because they seem to explain why needling at odd points has effects on distance organ systems. So, there may be evidence coming of a very different signaling system in the body.

Finally, in summary, where are we going with acupuncture research? We're exploring what this traditional system can tell us about health and healing, about how the body works that western medicine hasn't yet discovered. To me, it's not so interesting that when we needle at an acupuncture point that is traditionally used to stimulate the immune system, we measure an increase in natural killer cells and an increase in B cells or other types of cells in the immune system. That's fine. That's just correlational. I want to know

if acupuncture can tell us things about how the body works that we don't yet know. When I say we don't yet know how to explain how can you put the needle in the same point and it will increase the antibodies in my saliva if I'm secreting low levels, but if I'm secreting high levels, it will decrease, it's the same point. What is that about? There has to be some very basic self-regulatory system that may be more primitive than the immune system, the nervous system, the endocrine system, and the circulatory system. We don't know yet.

When we start to do research, we can't keep doing acupuncture research as if it's a drug. We can't just keep testing one dose of acupuncture. That's not the way acupuncture is given if you go to an acupuncturist, if given in the clinic. We give different kinds of acupuncture, different selection of points for different people. We have to start beginning to design acupuncture research that reflects what happens in the clinic. When we do research, not just in acupuncture, but also in chiropractic, in naturopathy, and all the other CAM therapies you've been hearing about, we're not doing research on something new. So, when the FDA says, we have to do clinical trials on a new drug or a new procedure or a new medical device, that's for sure. We have to test those and make sure they're better than placebo, before we can use them in clinical practice. But with something like acupuncture research, we're playing catch-up.

We're doing research on what people are already using and being helped for. So, we shouldn't be spending all our research dollars on seeing if acupuncture is better than placebo. We should be spending a lot of those research dollars on comparing real world treatment options. When I asked before, do you care more if you have tennis elbow? Do you care more if acupuncture is better than placebo for tennis elbow, or do you care if acupuncture is as good as steroid injection but with fewer side effects? We want research that reflects clinical practice and that compares real world treatment options.

Finally, I want to introduce you to this concept, traditional East Asian medicine. When Jerry was using the term oriental, she stumbled on it. We all stumble on the term. Oriental medicine is one of the few areas where the term Oriental is still used and it's not

somehow felt to be derogatory. We can't use the term Asian medicine to describe acupuncture because there are other types of medicine from Asia. There's Ayurvedic medicine, there's Tibetan medicine, and these are very different systems of care. So, we're starting to use the term East Asian medicine. We can't use Chinese medicine as the term because even though that seems to be where it started, it's moved to Japan and to Korea and to Vietnam and to many other countries that have changed it slightly over the hundreds and thousands of years. So, we're using the term East Asian medicine or, as one acupuncture researcher likes to call it, traditional East Asian medicine, because the acronym is team, the team approach.

So, we want to start doing research on acupuncture and East Asian medicine as complementary care. A major area where this is beginning is in cancer therapy. Before you get all this awful chemotherapy and radiation—and I'm not saying there aren't times when that's needed, but we know that's going to knock the hell out of your immune system—why not first use acupuncture and Chinese herbs that are known to stimulate the immune system? During it. Not wait until after it's done and then use drugs like Neupogen, which are extremely expensive, for stimulating an immune system after it has been suppressed. So, there are many areas of cancer research where acupuncture and western medicine can be used together in exciting ways.

Finally, we have to think that acupuncture is part of a whole other system of care. Acupuncture is one modality, we say, within traditional East Asian medicine that includes Chinese herbs, a Chinese style of massage, exercise, and specific ways of dealing with nutrition in Chinese medicine. A patient should be thought of as a system. The type of care they're given should be thought of as a system. We have to begin to start designing research that looks at the whole system of care, if we are going to really figure out what is the best way to treat individual people.